

With respect to claim 1, the Examiner states:

Prengle discloses a method of fabricating a BiCMOS integrated circuit comprising the steps . . . forming in a single implantation step a base region of a bipolar transistor (3) and a p-well (24) of an n-channel MOS transistor (5), note column 4 lines 7-30 Figure 3, . . .

The above citation by the Examiner is primarily to the discussion in the Prengle patent of its illustrated structure of Figure 1, whereas the present claim is directed to a "method of fabricating a BiCMOS integrated circuit." Thus, Applicants respectfully submit that a more thorough comparison of the Prengle patent to the pending claims must include the later discussion in the Prengle patent wherein it discusses its method of fabricating its illustrated device, where such discussion commences generally at column 7, line 14 and pertains to the various steps as illustrated in Figures 2a through 2i of the Prengle patent. The following discussion focuses on claim 1 and this additional discussion in the Prengle patent.

Claim 1 recites the step of "forming . . . a base region of a bipolar transistor and a p-well of an n-channel MOS transistor." As to the claimed "p-well of an n-channel MOS transistor," the Examiner cites to p-well (24) in the Prengle patent; however, the Examiner does not expressly identify the reference number of what is considered to anticipate the recited "base region of a bipolar transistor." The Prengle patent identifies an "intrinsic base region 69"¹ and an "extrinsic base region 82,"² so presumably the Examiner is indicating a belief that one of these two regions anticipates the "base region" in claim 1. In any event, claim 1 also recites with respect to its first-recited forming step that there is a "forming *in a single implantation step*" of those recited elements (i.e., the bipolar transistor base region and the p-well of an n-channel MOS transistor). This recitation is not shown in the Prengle patent. Instead, note how in column 7, lines 35-38, the Prengle patent first discusses the formation of the p-well (24) cited by the Examiner, and which is described in connection with its Figure 2a as follows:

Masked implants are then performed, followed by annealing, to form . . . p-type regions 24 (and 24').

¹ Column 4, lines 10-12.

² Column 4, lines 18-22.

However, after numerous other items are constructed relative to the Prengle BiCMOS device, and only in the far later Figure 2f of the Prengle patent, does the bipolar transistor base region first appear since it is only formed as illustrated in Figures 2d through 2f. Specifically, this may be seen by looking far later within the Prengle patent, namely, at column 8, lines 34-34, which recite:

Ion implantation of boron is then performed in order to dope the portion of n region 20 with the intrinsic base implant, as shown in Figure 2d. . . .

Still further, even farther into the Prengle patent, it states at column 11, lines 5-15:

The surface of the intrinsic base region 69 at location 74 will thus be exposed after this etch, so that extrinsic base region 82 can be formed thereat, via ion implantation and diffusion.

Given the preceding, the Prengle patent does not teach the recitation of claim 1 of "forming *in a single implantation step* a base region of a bipolar transistor and a p-well of an n-channel MOS transistor." Accordingly, Applicants respectfully submit that the rejection of claim 1 based on the Prengle patent should be withdrawn.

In addition to the preceding and also with respect to claim 1, the Examiner states that Prengle anticipates the second forming step recited in claim 1, where the Examiner particularly asserts:

. . . forming in a single implantation step a collector contact well of a bipolar transistor and an n-well (20) of a p-channel MOS transistor, note column 4 lines 23-29.

With respect to this assertion, Applicants note that claim 1 recites a "collector *contact* well of a bipolar transistor." Here again, the Examiner has not identified precisely what element in the Prengle patent represents a "collector contact well," but it is admitted that the Prengle patent expressly identifies an "n+ region 52" that is "providing a surface contact" to the sub-collector 8,³ and this same region is later referred to as a

³ Column 4, lines 2-5.

"collector contact 52."⁴ Presumably, therefore, the Examiner is suggesting that it is this "collector contact 52" in the Prengle patent that is used by the Examiner, in part, to anticipate the second-recited forming step of claim 1. Even under this assumption, Applicants show below that the Prengle patent also does not anticipate the second-recited forming step of claim 1.

Claim 1 also recites with respect to its second-recited forming step that there is a "forming *in a single implantation step*" of those recited elements (i.e., the bipolar transistor collector contact well and the n-well of a p-channel MOS transistor). This recitation is not shown in the Prengle patent. Instead, in column 7, lines 35-37, the Prengle patent discusses the formation of the n-well (20) cited by the Examiner, and which is described in connection with its Figure 2a as follows:

Masked implants are then performed, followed by annealing, to form n-type regions 20 and . . .

Note also that n-type regions are shown in Figure 2a with an "N" designation for their doping level. However, the collector contact region 52 is an N⁺ region suggesting a different doping concentration and, hence, a different step requiring the formation of that region. Indeed, the Prengle patent at column 7, lines 37-40 states:

Ion implantation and annealing can be performed in order to form deep n⁺ collector contact region 52, . . .

Thus, it is respectfully submitted that in Prengle the "n⁺ collector contact region 52" is formed in a different and later step than its "n-type regions 20." Given the preceding, the Prengle patent does not teach the recitation of claim 1 that there is a "forming *in a single implantation step* a collector contact well of a bipolar transistor and an n-well of a p-channel MOS transistor."

In view of the preceding, Applicants respectfully submit that the rejection of claim 1 should be withdrawn, thereby leaving claim 1 in condition for allowance.

⁴ See, e.g., column 4, lines 14, 36.

Claim 2 is as follows:

2. A method for fabricating a BiCMOS integrated circuit, comprising the steps of:

forming an n-type collector region with a semiconductor substrate of lighter doping;

forming a plurality of p-type wells, at least one of said plurality of p-type wells forming a base region lying between said collector region and a surface of said semiconductor substrate, said base region adjoining said collector region and extending to said surface, and at least one of said plurality of p-type wells forming an n-channel MOS well;

forming a plurality of n-type wells, at least one of said plurality of n-type wells forming a collector contact well lying between said collector region and said surface of said semiconductor substrate, said collector contact well adjoining said collector region and extending to said surface, further said collector contact well lying between said base region and said n-channel MOS well, and at least one of said plurality of n-type wells forming a p-channel MOS well; and

forming an emitter region adjoining said base region, said emitter region extending to said surface.

The Examiner again makes various citations within the Prengle patent, but the Examiner does not expressly identify which region in the Prengle patent anticipates the "n-type collector region" introduced in the first subparagraph of claim 2. The Examiner does state that Prengle shows:

forming a plurality of p-type wells (24), at least one of said plurality of p-type wells forming a base region (69) lying between said collector regions and a surface of said semiconductor substrate (2), said base region (69) adjoining said collector region and extending to said surface, and at least one of said plurality of p-type wells forming an n-channel MOS well

However, since the Examiner does contend expressly that base region 69 is "adjoining said collector region," then Applicants assume based on Prengle's description and

Figures that the Examiner is contending that Prengle's "n region 20" is what anticipates the claim 2 recited "collector region" because, for example, Prengle Figure 1 shows its base region 69 adjoining its n-region 20. Given this assumption, however, it is shown below that the Prengle patent also does not anticipate claim 2.

Claim 2 recites numerous structural relationships between the elements cited therein, and Applicants struggle slightly with the Examiner's contentions based on the Prengle patent since the Examiner does not in various instances expressly identify which element in the Prengle patent is believed to anticipate a corresponding element in claim 2. However, even given various assumptions and without waiving any additional distinctions between claim 2 and the Prengle patent, Applicants bring to the Examiner's attention that the next-to-last subparagraph of claim 2 recites, "further said collector contact *lying between* said base region and said n-channel MOS well." As demonstrated above, the Prengle patent discusses a "collector contact 52"; it is assumed that the Examiner contends it is this contact 52 that shows the "collector contact well" recited in claim 2. Thus, to anticipate claim 2, the Prengle patent would have to teach that its "collector contact 52" meets the claim 2 recitation such that collector contact 52 is "*lying between* said base region and said n-channel MOS well." However, Prengle Figure 1 (and other Figures) depict the collector contact 52 to the far left of the Figure, while the p-well 24 of its n-channel MOS transistor is located to the far right side of the same Figure 1. Thus, it cannot be shown in Prengle that there is a "collector contact lying between said base region and said n-channel MOS well" as recited in claim 2.

In view of the preceding, Applicants respectfully submit that the rejection of claim 2 should be withdrawn, thereby leaving claim 2 in condition for allowance. Moreover, for at least these reasons, claims 3 through 5, which depend from claim 2, are also in condition for allowance.

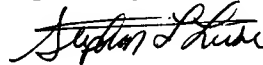
From the above, Applicants respectfully submit that all of the pending claims 1 through 5 are in condition for allowance. Reconsideration and favorable action of the above-referenced application are respectfully requested.

Fees

The fee for the enclosed petition for an extension of time for a one (1) month extension is addressed in the Fee Transmittal (for FY 2001) sheet filed herewith and is requested to be charged to deposit account number 20-0668 of Texas Instruments Incorporated.

The Commissioner is also hereby requested and authorized to charge any additional fees necessary for the filing of the enclosed papers to deposit account number 20-0668 of Texas Instruments Incorporated.

Respectfully submitted,



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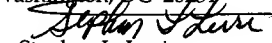
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37 C.F.R. § 1.8

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